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CITY OF MANCHESTER
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Received 8/15/2013

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Mr. Newton Tedder
USEPA – Region 1
5 Post Office Square, Suite 100
Mail Code OEP06-4
Boston, MA 02109-3912

Subject: **City of Manchester**
Review Comments on
2013 Draft New Hampshire Small MS4 General Permit

Dear Mr. Tedder:

The City of Manchester (City) is pleased to submit comments on the 2013 Draft New Hampshire Small MS4 General Permit. I requested my staff to review the permit requirements and to attend and participate in the public hearing that was held on March 14, 2013 in Portsmouth, NH. Once the complexity and costs of the draft permit became evident the City expanded our permit review efforts. Our staff met regularly with the New Hampshire Department of Environmental Services (NHDES) over the past few months to discuss key permit requirements. In addition, a regional stormwater coalition was formed and legal council was retained to assist with our draft permit comments. Lastly, we consulted with several engineering firms for their feedback on the draft permit requirements.

Our comments are extensive and detailed. We present general comments that pertain to the overall permit and specific comments citing permits clauses and requirements. To support our comments we have conducted preliminary engineering assessments to determine general treatment needs and costs. In addition, we have appended to these comments recent engineering studies to support our preliminary engineering and review comments. Lastly, we have also submitted comments under separate cover prepared by our legal council Sheehen Phinney Bass & Green, PA on behalf of the New Hampshire Stormwater Coalition. Our comments are presented in the following format:

I. General Comments
II. Specific Review Comments
III. Preliminary Engineering Comments
IV. Appendices (1 through 15)

The draft MS4 permit has significant and costly long-term impacts to the City of Manchester. We look forward to working with EPA in developing this permit as a useful tool to continue our partnership of environmental stewardship in a practical, reasonable, and cost effective manner.

Sincerely,

Kevin A. Sheppard, P.E.
Public Works Director

Cc: Mayor Theodore L. Gatsas
Mr. Jeff Andrews, P.E. – NHDES
Mr. Tim Clougherty
Mr. Fred McNeill

I. General Comments

1. Insufficient Implementation Schedule

The City has a well established history of stormwater environmental stewardship. We have had an Urban Ponds program for over a decade and have demonstrated water quality improvements through the implementation of several structural and non-structural stormwater best management practices (BMPs). Based on our experience, to implement the requirements of this draft permit in five years is unrealistic and cost prohibitive. The requirements of this permit more realistically will require about 20 years of sustained work based upon our 13 years experience with our formal Urban Ponds Program. Within our comments we recommend that this be extended to a 20 year permit with the first five years focusing on data verification.

2. Data Verification Required

A significant portion of the water quality data that this permit is being based is dated, in some cases there are insufficient data points, and the sampling techniques used are unknown. Considering this program will cost hundreds of millions to implement, it is imperative that sound and accurate science be used to determine the appropriate mitigation measures. We have partnered with DES in sampling programs in the past using clean sampling techniques governed by a formal QA/QC program. We propose that we continue this sampling partnership and focus the first five years of the permit on data verification. This will help ensure that appropriate, cost effective, and successful mitigation measures are implemented.

3. The City will be in Intermediate Noncompliance

If this permit is implemented; because of wording *"Discharges shall not cause or contribute to an exceedance of applicable water quality standards (including numeric and narrative water quality criteria) for the receiving water."* the City, because of its combined sewer overflow (CSO) system, will be in non-compliance the day the permit is issued. This will put the City at risk to fines and regulatory compliance actions. We recommend the permit be modified in several areas to allow communities to work towards compliance in a practical, realistic, and cost effective manner.

4. Interjurisdictional Issues and Responsibilities

This permits deals with watershed based issues. However, the permit, and its compliance responsibilities, are being issued to individual communities. Therefore, the community where the water bodies are located will be responsible for compliance despite not controlling the flows from neighboring communities that contribute to water quality impairments. There are ponds within the City that receive 70% of their flows from communities outside of Manchester. In addition, the New Hampshire Department of Transportation (NHDOT)'s highways are significant contributors to the City's pond water quality impairments. There is also atmospheric deposition which is a national problem and contributes to the City's water impairments. This permit should be

restructured to address impairments on a watershed basis with all stakeholders contributing in a fair and equal table manner as opposed to individual communities being forced to assume the full implementation and financial responsibility.

5. Cost Prohibitive/Unfunded Mandate

The cost of the City's full compliance with this five-year permit is estimated to be over $700 million. For comparison, the City's annual operating budget is about $300 million. With so many competing interests for the City's limited funding, compliance with this draft permit is cost prohibitive.

This permit is an unfunded mandate as defined in Article 28-a of the State's Constitution, Bill of Rights, adopted on November 28, 1984 states, *"The state shall not mandate or assign any new expanded or modified programs or responsibilities to any political subdivision in such a way as to necessitate additional local expenditures by the political subdivision unless such programs or responsibilities are fully funded by the state or unless such programs or responsibilities are approved for funding by a vote of the local legislative body of the political subdivision."*

Sewer and water are specifically included in Section 541-A: 25 Unfunded State Mandates II of the Administrative Procedures Act State, *"Such programs also include, but are not limited to, functions such as police, fire and rescue, roads and bridges, solid waste, sewer and water, and construction and maintenance of buildings and other municipal facilities or other facilities or functions undertaken by a political subdivision."*

6. Second Public Review of the Draft Permit

Due to the significant comments presented by the City of Manchester and other members of our stormwater coalition, we request a second public review of this draft permit. When it was first issued in 2008 several communities submitted comments and it took EPA five-years to address these comments and re-issue the permit. The comments submitted in 2013 will be even more extensive and detailed. Considering the complexity of the permit and the volume of comments EPA will receive, it will benefit all stakeholders if the permit is issued for public comment again. Considering the City is facing up to $700 million in compliance cost, it is imperative that we all work together in developing a practical, reasonable, and cost effective permit

II. Specific Review Comments

1.10 Stormwater Management Program (SWMP)

Under c. *"The permittee is encouraged to maintain an adequate funding source for the implementation of this program. Adequate funding means that a consistent source of revenue exists for the program."*

The concern that we have along with the other communities that were represented at the public hearing is with the costs associated with this program. In this economic environment with budget cuts and lost revenues the communities that are regulated under this permit including

Manchester would have a difficult time ensuring these funds will be available and therefore complying with this section based on the current permit requirements and associated costs. The costs to comply with this permit as outlined with these comments would cost in excess of $700 millions of dollars. Currently stormwater is funded under the City's general fund and is therefore subject to budget cuts due to the budget constraints that we all are facing. The City of Manchester has been funding the current program, but we do not have the funds needed to implement the Stormwater Management Plan (SWMP) associated with the extensive and burdensome requirements of this permit.

1.10.2 Contents of the Stormwater Management Program

"Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4..."

The concern that we have is that MS4s are interconnected with other MS4s and other non-permitted separate storm sewer systems. This makes it difficult to administer certain requirements of this permit as a water body can be in one community and receive discharges from other communities and entities that make it difficult to have them share the costs of their share of the loadings.

2.1.1 Requirement to Meet Water Quality Standards

"Discharges shall not cause or contribute to an exceedance of applicable water quality standards (including numeric and narrative water quality criteria) for the receiving water."

Compliance with this requirement can be challenging for any community, because according to the TMDLs and impairments communities are already not in compliance with water quality standards and will be in non-compliance with this permit once it becomes effective. The community will then need to prove through sampling requirements and BMP implementation that they are in compliance. Unfortunately some of the target goals are not realistically attainable and will keep the community from being compliant with this permit over its term.

2.1.2 New or Increased Discharges

"There shall be no new or increased discharges from the MS4 to impaired waters unless the permittee demonstrates that there is no net increase in loading from the MS4 to the impaired water of the pollutant(s) for which the water body is impaired."

The City of Manchester is a Combined Sewer Overflow (CSO) community and is required to separate our sanitary and storm sewers. Through this separation program, stormwater is being directed to water bodies such as the Merrimack River, combine this with the change in climate and it is not feasible to not increase discharges to impaired water bodies. In this case compliance with one EPA requirement will cause non-compliance with this draft permit.

2.2.1 Discharges Subject to an Approved TMDL

In the State of New Hampshire there are approved TMDLs for chlorides, bacteria, and phosphorous. For bacteria there is an approved statewide Bacteria TMDL and the Beach Bacteria TMDL. The City of Manchester is included in this TMDL. The Merrimack River,

Cohas Brook, and Crystal Lake Beach are under this TMDL. Some of the requirements including needing to prepare a Water Quality Response Plan (WQRP) and proposed BMPs to meet the load reductions. The load reductions range from 56% to 94%. As stated earlier, the City will not be able to meet compliance with this requirement because we still are a CSO community ($165 million Phase II separation program ongoing) and the separation schedule is beyond the five year term of this permit. It is also important to note that sources of bacteria include wildlife and waterfowl that we cannot control. The cost alone to prepare a WQRP is approximately $65,000 per plan per water body to study sources and develop BMPs, this does not include actual implementation of the BMPs.

There are ten communities including City of Manchester that must comply with Approved Phosphorous TMDLs. We have four water bodies that have a TMDL. These include Dorrs Pond, Nutt Pond, Pine Island Pond, and Stevens Pond. To comply with this TMDL we must develop Phosphorous Control Plans (PCP) for each pond and implement the BMPs within five years. The BMPs include both structural and non-structural BMPs. The load reductions range from 50 to 73% based on a limit of 12 ug/l of Total Phosphorous (TP). The cost for the PCPs are $60,000 per plan per water body to study the sources of the phosphorous and develop BMPs, this does not include actual implementation of the BMPs.

The TMDLs are based on a Waste Load Allocation (WLA) + Load Allocation (LA) + Margin of Safety (MOS). The MOS is 20%. WLA + LA + MOS = 12 ug/l of TP. These TMDLs were based on models and did take into account recent sampling showing current reduction trends.

The City has been sampling our urban ponds through the NHDES Volunteer Lake Assessment Program (VLAP). Sampling is done during the summer months from the hours of 10 AM to 2 PM when the sunlight is the strongest to test for many parameters including TP and Chlorophyll-A. We have seen reductions in TP that was not accounted for in the required reductions of 50 to 73%.

In the Nutt Pond Watershed the City of Manchester has completed many projects to remove both sediment and TP from reaching the pond. This work was done through both City of Manchester and EPA 319 Grant funds. A Watershed Restoration Plan (WRP) was developed and approved by the NHDES. In that plan the target goal for TP was 15 ug/l. in 2010 and in 2012 the average sampling result for TP was 15 ug/l. Based on the WRP we achieved our goal of reducing TP to the target goal of 15 ug/l. Please note that the watershed for this pond is 60% impervious and we spent over $1.1 Million to achieve this goal and we are going to spend approximately another $350,000 to install to construct a gravel wetland, bioretention cell, tree box filters, and a new boat ramp to further reduce our loadings to the pond. These costs do not include any of the annual operation and maintenance costs associated with this work. Even though we will have spent approximately $1.5 Million we do not feel that the limit of 12 ug/l is attainable and that the EPA needs to work with the NHDES to revise the Phosphorous TMDLs to include actual sampling results and develop a realistic timeframe to study the ponds, develop PCPs, select and implement BMPs. A five year timeframe is not realistic to do these activities.

The other issue for these TMDLs is that even if a water body is located in a community, due to the fact of interconnected MS4s that community might not be the only one discharging to that water body. An example is Dorrs Pond that is located in the northern part of the city. Dorrs Pond receives from the community of Hooksett and from the NH Department of Transportation (NHDOT). To help distribute the costs evenly a study would need to be done to determine the

contribution each discharger has to Dorrs Pond and an intergovernmental agreement would need to be drafted to help distribute the allocation of costs associated with the BMPs. Because of these and other concerns this requirement should be revised to only include the development of the plans and the associated studies to develop the plans. Implementation of BMPs can be during the next permit period. This permit requirement is realistically a twenty year requirement that can be developed in phases during subsequent permit cycles.

2.2.2 Discharge to Impaired Water without an Approved TMDL

Communities that discharge to an impaired water body other than a chloride impaired water body must take a three phased approach. The phases are as follows:

- Phase 1: Preliminary evaluation and source identification. Then develop a WQRP to assess potential sources, identify additional or modified BMPs beyond what is identified in the Stormwater Management Plan (SWMP). This needs to be completed one year from the effective date of the permit.

- Phase 2: Implementation of BMPs and finalization of the source identification and assessment. This needs to be completed three years from the effective date of the permit.

- Phase 3: Assessment BMPs that were implemented under Phase 2 to evaluate if the BMPs are sufficient to reduce the pollutants for the impaired water bodies.

Based on review of the phases it appears that the communities are being tasked with essentially the same requirements as are associated with a TMDL, except that they also need to do some of the studies that are used to develop a TMDL that is normally done by the NHDES. It appears that due to budget constraints the EPA is requiring the communities to do the work of the NHDES under this requirement. The City of Manchester has approximately 16 water bodies that would need WQRPs developed under this requirement at a cost of $65,000 per plan per water body to study sources and develop BMPs, this does not include actual implementation of the BMPs.

The five year permit term is not enough time to implement this requirement as currently outlined. It also puts all the burden of the study on the communities and does not place any burden on the EPA or the NHDES. We ask that the EPA takes another look at this requirement and delays its implementation until the NHDES revises the 303 (d) list for impaired waters. The 303 (d) list needs to reflect updated sampling in accordance with a formal QA/QC program. We offer to work with the NHDES to ensure that the sampling is updated and the impairments to the water bodies reflect what are the current conditions observed and not based on old data. We ask that during the first five year permit term that the monitoring is performed and that during the following permit cycles plans are developed in conjunction with the NHDES to work towards minimizing the impairments. This permit requirement is realistically a twenty year requirement that can be developed in phases during subsequent permit cycles.

In regards to this requirement it is also the same as the TMDL (2.2.1) in the fact that loads need to be accounted for from their entities that discharge to the water body such as other Traditional and Non-Traditional MS4s.

2.2.3 Discharge to a Chloride Impaired Water in New Hampshire

Communities that discharge to a chloride impaired water body that does not have a TMDL must develop a Salt Reduction Plan within three years of the effective date of the permit. There are 13 communities with 27 water bodies that fall under this requirement. In the City Manchester the following water bodies fall under this requirement: Baker Brook, Dorrs Pond, Nutt Pond, Ray Brook, and Stevens Pond.

The City has water bodies that receive dischargers from other Traditional and Non-Traditional MS4s. The best example is Stevens Pond that is located under Interstate 93 which is owned by the NHDOT. This pond receives discharges from the City and the NHDOT road networks. In this area the NHDOT road network is much more extensive than Manchester's is and contributes a much higher chloride load to this pond, therefore they should share in the cost of reducing the chloride load.

The community must also identify parking lots that are 10 spaces or greater that discharge to the MS4 and develop requirements that make sure that the salt applicators are trained and certified and that they provide the community with annual salt usage. Salt applicators can change from one season to another based on their price to treat the parking lots. In New Hampshire the Green SnoPro Certification Program was developed to help train and certify applicators across the state. These salt applicators also track their salt usage. The EPA should consider that this requirement is met through this state program and not pass this requirement down to the individual community.

Requirements for new and redeveloped properties must be established that will minimize salt usage, track salt usage, and report to the community their annual salt usage. This requirement can also be met through the Green SnoPro Certification Program.

2.3 Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)

"The permittee shall reduce the discharge of pollutants from the MS4 to the maximum extent practicable (MEP), as set forth in parts 2.3.2 through 2.37."

The EPA needs to further define what the MEP is. What one community defines as MEP might not be the same as the EPA or as another group may define MEP. This can leave a community open to fines and litigation.

2.3.2 Public Education and Outreach

"The ultimate objective of a public education program is to increase knowledge and change behavior so that pollutants in stormwater are reduced."

The City of Manchester supports the public education element of the permit. We need to attempt to educate the public to be more environmentally conscious. The concern is that how a community can measure a change in behavior. The EPA needs to develop tools to help the communities' measure a change in behavior and the EPA also needs to define what they see as a change in behavior.

The EPA and the NHDES should also work together to develop public service messages and give guidance to the municipalities on messages for the different audiences.

As written, the MS4 permit requires each community individually to conduct public education and outreach activities. This is one area in which groups of communities could work together to develop public education and outreach materials since the messages would be very similar or would overlap and it would be far more cost-effective if groups of communities could share resources to help reduce the overall burden on any one community. It will take time to develop targeted and appropriate education and outreach materials and it will take time to form the multi-community partnerships and groups needed to accomplish this.

In terms of measuring outcomes and results to measure effectiveness, it is first necessary to define the criteria that could be used to make such an assessment. Then it would be necessary to establish some type of baseline condition before results could be monitored and assessed. This is simply not practical within a 5-year time frame.

2.3.4 Illicit Discharge Detection and Elimination (IDDE) Program

"The permittee shall implement an IDDE program to systematically find and eliminate sources of non-stormwater from the separate storm sewer system and to implement procedures to prevent illicit connections and discharges."

"Illicit discharges to the MS4 are prohibited, and any such discharge violates this permit and remains a violation until eliminated."

The communities that are regulated under this MS4 permit recognize the importance of correcting illicit discharges. Manchester has implemented an aggressive illicit discharge protocol after the issuance of the 2003 Stormwater Permit in which the City reports findings annually in the stormwater reports. This illicit discharge program under the current permit does screening of areas through testing for E-Coli. Mancheste4r has found that almost all of the discovered illicit discharges were not caused by the municipality, but by residents within the community. The municipality should not be held culpable for the actions of private citizens, but should take every step to assure these discharges are eliminated once discovered..

In this permit the EPA is trying to regulate Sanitary Sewer Overflows (SSOs). These are already regulated through our NPDES Wastewater Discharge Permits and through our Capacity Management Operation and Maintenance (CMOM) Programs. This is considered a duplication of efforts and should not be regulated under this program.

"The permittee shall complete the Catchment Investigation Procedure in a minimum of 80% of the MS4 area served by Problem Catchments within 3 years of the permit effective date and 100% of Problem Catchments within five years of the permit effective date."

"Samples shall be analyzed at a minimum for ammonia, chlorine, conductivity, salinity, E-Coli (freshwater receiving water) or enterococcus (saline or brackish receiving water), surfactants (such as MBAS), temperature, and any other pollutants pursuant to Part 4.3.1."

The EPA needs to be flexible in its screening methods and what is accepted. In other regions of the country canine detection is used as an effective screening tool and it should be allowed in

this region. It has already been used and showed success in New England. If through the screening program an illicit discharge is detected, then further testing should commence. The required testing as it is outlined in the permit is a tremendous drain to the City of Manchester's resources.

3.1 Requirements for MS4s in New Hampshire

If NHDES determines that additional water quality certification requirements are necessary to protect water quality, then it may require applicants to meet additional conditions to obtain or continue coverage under this permit.

This requirement is difficult to plan and budget for as at anytime the NHDES can require a community to adhere to additional water quality requirements that were not outlined originally in this permit. This requirement needs to be reviewed by both the EPA and the NHDES to see if it is necessary or indeed fair to the community.

4.3 Outfall Monitoring

"The permittee shall monitor and sample its outfalls at a minimum through sampling and testing at the frequency and locations required in connection with IDDE screening under Part 2.3.4.8.d. through g. and 2.3.4.9.

The same comments that pertain to 2.3.4 Illicit Discharge Detection and Elimination (IDDE) Program pertain here and should be considered for this requirement.

III. Preliminary Engineering Comments

TMDL Public Notice and Expectations

Manchester was complying with a 'Watershed Restoration Plan' at the time Public Notice for the TMDLs in New Hampshire were issued. As we were following an approved plan, the expectation was the outline and premise of that plan would supersede any subsequent TMDL. Manchester had received notice of the new TMDLs via the 'Public Notice' process in late 2009 early 2010. The Executive Summaries of all four pond TMDLs outline the following sentences, *"The load allocation puts primary emphasis on reducing watershed phosphorus sources over other sources due to the relative load contribution from the watershed and practical implementation considerations. It is expected that these reductions would be phased in over a period of several years."*

At the time of the TMDLs public comment Manchester had a well established viable 'Urban Ponds Program' as a consequence of a CSO Administrative Order of 1999 and the 2003 MS4 Permit. In April of 2008, Manchester had completed a "Restoration Plan" for Nutt Pond as prepared by CEI and agreed upon in scope; modeling and engineering calculations by both the NHDES and EPA (see **Attachment 1**). Manchester had fully anticipated that this same process would be the condition for the other ponds so no comment was put forth on the TMDLs.

By the end of 2009 and early 2010, when the comment period was in place, there was an overall understanding between both the NHDES and the City of Manchester that our Urban Pond program was working very well and that the Stormwater annual report submissions were more than what was required. Manchester has never heard any concerns from either the EPA, or the NHDES with the

progress of our program and Manchester was led to believe, through the development of the Nutt's Pond Watershed Restoration Plan, that a target TMDL for our ponds was 15 ug/l for phosphorus. At that time of the TMDL notice, the program had been in existence for 10 years. Manchester had been making steady progress with compliance and the indication provided by the regulatory community was that everything was going well. The expectation was that the Restoration plan, agreed to by all parties a year previous, was the controlling document and the basis for Manchester moving forward on the Urban Pond Program.

Watershed Modeling Overview

Manchester is outlining the assumptions made in both the CEI Watershed Restoration Plan and the AECOM TMDL to identify significant modeling differences within both approaches. Both models, in view of predictive conditions vs. actual field conditions are off by greater than 90%. The specifics of each model are viewed in detail and demonstrate that phosphorus is not always an accurate predictor of algal blooms. There are many other conditions that can contribute to algal blooms.

The CEI Plan, page 3-1 under 3.1, Critical measurement states, *"It is expected that the goals may take years to achieve and actual in-pond measurements can vary widely from year to year due to climatic factors, therefore, the overall average and trend is important to review."* As the Nutt Pond Restoration Plan has been a focus of the City's for 13 years, and has yet to achieve WQ criteria, it would be unreasonable to expect full compliance with the currently issued MS4 permit in the five-year permit cycle. The experience with Nutt Pond demonstrates that even two five-year permit cycles would not have achieved compliance and this is the smallest pond within Manchester with a current TMDL.

The CEI, Watershed Restoration Plan, is very similar to the AECOM TMDL for Nutt Pond (**Attachment 2**) in basic assumptions.

Nutt Pond Watershed Restoration Plan

	Lake Area Acres	Lake Vol Gallons	Water Budget (gals/yr)	Watershed Acres	Gallons per Acre	Modeled TP Loading	Target TP Loading
AECOM	17.5	69,383,601	637,652,672	645	988,715	230.3 lbs	69.1 lbs
CEI	17.3	69,000,000	667,000,000	557	1,197,487	161.32 lbs	75 lbs

Note that the watershed acreage is different by 13.6% and the TP load is different by 30%. CEI used one model (Reckhow) and AECOM used an average of five models of which Reckhow was one and it had the lowest TP modeling predictive load of 28 ug/l (Kirchner-Dillon – 35 ug/l, Vollenweider – 39 ug/l, Larsen-Mercier – 32 ug/l, Jones-Bachmann – 34 ug/l and Reckhow – 28 ug/l). The calculated mass balance was 43 ug/l. It would appear that Reckhow is the most liberal of the group in predicting TP modeling.

The five AECOM empirical models have a predicted in-lake TP concentration for Nutt Pond between 28 and 39 ug/l which is a 28.2% variation. When compare the mass balance calculated amount of 43 ug/l that variation increase to 35%. That's a significance variation that can mean millions of dollars in the planning stage.

Even though Manchester has questions regarding the accuracy of the modeling there are now established TMDLs for these four ponds. The models for Dorr's and Nutt Pond state a algal bloom probability of 37.6% for Nutt Pond and 28.3% for Dorr's Pond. In 13 years of observation a algal bloom has never been witnessed on Dorr's Pond and only one small bloom at Nutt's Pond in October 2007 that covered less than 1% of the total water surface area (see photo in attachment No. 2). This puts the actual algal bloom probability over the past 13 years at 0% for the Dorr's Pond and 7.6% for Nutt Pond. This is significantly lower than the bloom rate calculated in the models.

The last bullet on page 7 of the MS4 draft permit states, *"The NHDES policy for interim nutrient threshold for primary contact recreation (i.e. swimming) in NH lakes is 15 ug/L chl-a. Lakes were also listed as impaired for swimming if surface blooms (or "scums") of cyanobacteria were present. A lake was listed even if scums were present only along a downwind shore."* This cyanobacteria bloom was on the downwind shore of Nutt Pond (see pictures in **Attachment 3**).

The north inlet is where the pictures were taken. The area of bloom is roughly calculated as 150 feet along the shore to about 10 feet from the shore (1,500 square feet). Nutt Pond has 7.1 hectares or 17.5 acres. The total surface area is 762,300 sq. ft. That is $2/10^{th}$ of 1% of surface area covered in October. No other visual verification on either of the two ponds was noted in 13 years of sampling events or pond visits. This is hardly a justifiable recreational impairment when it happens only once in 13 years and in October when the swimming season has ended. Also note on **Attachment 4** (CEI Table 2-6) the total phosphorus levels for 2002 (average 25.5 ug/l TP with a maximum of 29 ug/l), 2003 (average 30 ug/l for TP with a maximum of 46 ug/l) and 2004 (average 33 ug/l TP with a maximum of 39 ug/l) yet none of these years had any evidence of algal bloom. This is significant field information as the TMDL models indicate there should be algal blooms on Nutt Pond 37.6% of the time (once every three years at a minimum). Even the models have significant variations in their predictive data output.

Watershed Modeling Specifics

The CEI report, page 2-11 states, *"Direct application of the calculated loads using the unadjusted pollutant loading values provided in Table 20-3 results in a predicted in-pond concentration of 282 ug/l, compared to the observed of 28 ug/l. Significant decreases to the literature based land use loading values were needed (91% reduction) to achieve calibration."* Table 2-3 uses both Northern Virginia and Reckhow land use TP loadings. This language outlines issues encountered with model calibration.

The AECOM report (page 3-4) implies that there were no such issues with their modeling efforts. The third bullet on page 3-4 indicates that, *"Areal loading estimates were attenuated based on natural features and implemented BMPs that would decrease loading. It was determined in the modeling that sub watersheds were attenuated by 58% and that a portion of the load to Nutt Pond is in particulate form and likely settles before it is available for phytoplankton. Using these levels of attenuation, we were able to predict annual average concentrations in the pond that were within the range of recent monitoring data."* Refer to Table C-4 of the AECOM report you find they also used Reckhow for land use TP loadings and Schloss rather than Northern Virginia in others.

Manchester has concerns with the modeling efforts done by AECOM. If Reckhow modeling indicated a needed model reduction of 91% to meet the most liberal modeling effort (28 ug/l predicted at a 15ug/l in-pond limit) then the AECOM modeling that used higher average figures was surely over a 91% reduction with the average predicted 34 ug/l at a 12 ug/l in-pond limit. Manchester is requesting that the AECOM modeling assumptions for Nutt Pond be forwarded for further review and

comparison to the CEI modeling before we can accept these loading conditions or agree to any MS4 permitting language. Manchester is assuming the error(s)/adjustments that needed to be made in the Nutt Pond modeling effort would be similar to representations made in the Dorr's Pond, Stevens Pond and Pine Island Pond TMDL modeling effort. This will provide Manchester with the magnitude of variation that is built into the AECOM TMDL Reports.

Both reports elaborate on concerns for the phosphorus trapped in the hypolimnion (bottom) layer that may, or may not, be available for phytoplankton uptake. The CEI report, page 2-6, indicated that Nutt Pond is stratified between April and October and that bottom TP concentrations from the hypolimnion layer are available between June and October. The calculation CEI uses (page 2-6) sets the hypolimnion layer at 130 ug/l. The AECOM report sets the hypolimnetic TP at 29 ug/l (Table 2-1).

This becomes a major concern as the AECOM TMDL requires a 70% reduction in TP loading (without potentially accounting appropriately for the hypolimnion TP contribution). If they discount the hypolimnetic TP potential loading, and CEI has estimated that load to be 30% of the total TP loading to Nutt Pond, then the maximum TP reduction would be in the range of 80% to 85% for the AECOM report rather than the 70% stated. It is well established that the maximum TP reduction that can be expected with all structural and non-structural BMPs put in place in any watershed is between 60% and 70%. In essence, Nutt Pond will never meet the TMDL target of 12 ug/l if you factor in hypolimnetic TP contribution outlined in the AECOM TMDL.

As pointed out in both documents, Manchester has been sampling the Urban Ponds since 2000 with a few earlier tests taken at Nutt Pond. The sampling data is included in Attachment 4 (Table 2-6 from the CEI report). Manchester has only observed one incidence of cyanobacteria (algal bloom) on Nutt Pond during that time (October 2007).

Nutt Pond 2007 Data

Date	Epilimnion Top layer	Metalimnion Middle layer	Hypolimnion Bottom layer
6/24/2007	19	19	69
7/22/2007	28	32	48
8/26/2007	22	34	17

It is clear that the higher TP hypolimnion layer of June contributed to the metalimnion layer and eplimnion layers in July and August. The hypolimnion layer steadily decreased from 69 ug/l to 48 ug/l to 17 ug/l while the metalimnion layer saw the steady increase from 19 ug/l to 32 ug/l to 34 ug/l. This supports CEI's inclusion of a higher hypolimnion TP in their equation.

More importantly, this data provides a snapshot into what Nutt Pond is capable of handling for TP loading before it reaches the state of algal bloom. The summer 2007 season algal bloom could have resulted from the transfer of TP through the three layers due to a season of uniform temperatures within the three layers. During 2007 the hypolimnion layer decreased from 69 ug/l to 17 ug/l. The metalimnion layer steadily increased from 19 ug/l to 34 ug/l and the epilimniion layer increased from June to July (19 ug/l to 28 ug/l) but then decreased to 22 ug/l in August. The significant decrease of TP in the lower layer demonstrates upward movement to the middle layer, which increases in TP saturation as the summer progresses. This increased middle layer is available for the upper layer and as the August TP falls, it is evidence that this TP is available for cynobacteria growth at a rapid enough pace to produce the small algal bloom at the north inlet. This may be indicative of lower

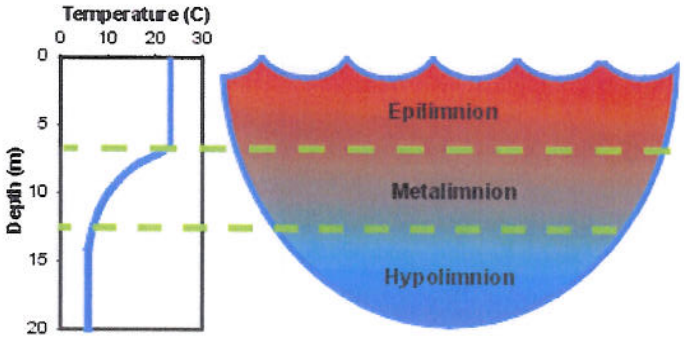
precipitation where pond water temperature is similar throughout the three layers which results in some type of turnover effect.

It may also indicate a year where hypolimnion layer dissolved oxygen was depleted creating anaerobic conditions and the rerelease of TP from this layer up into the upper layers. Without other supporting data it is hard to tell why 2007 had a bloom and there was no bloom in other years.

Note on attachment 4 that the 2002 season has similar TP concentrations in the upper layer, but that the middle layer shows a slight decrease in TP loading meaning the right amount of TP is never available in the upper layer for an algal bloom to progress. The 2003, 2004 and 2005 years follow the 2002 conditions to a certain extent and therefore, no algal blooms were noted in those years either.

It is evident that 12 ug/l TP in the epilimniion layer is an ultra conservative concentration standard that increases total abatement costs tremendously without need. As can be seen in the 2002 a maximum measured concentration of 46 ug/l of TP did not cause a bloom. In 2004 a measured level of 39 ug/l did not cause a bloom nor did a measured level of 33 ug/l in 2006 cause a bloom. It takes a specific required interplay of hypolimnion layer consistently depleted of oxygen rereleasing TP, the metalimnion layer of TP concentration steadily increasing, and subsequently providing a steady availability of TP to the epilimnion layer to produce an algal bloom. These three factors came together in 2007 at Nutt Pond.

As can be seen in the 2000 data there was a significant amount of TP (117 ug/l to 368 ug/l) available in the lower layer with similar transfer of TP to the middle layer, yet the top layer remained at 13 ug/l or less during the months of June, July and August. No algal bloom was seen as the stratified water temperature may have paralleled this model not providing a turnover effect for hypolimnion TP to rise to the surface. There are certainly other factors at play that are not considered within the models. These could include flush rate, amount of precipitation, amount of sunny days, surface wind, water temperature, etc.



Standard Temperature Gradient Lakes/Ponds

From what Manchester views within the dataset of Table 2-6 and has visually evidenced by one algal bloom, a simple step of placing supplemental aeration at the bottom of Nutt Pond and keeping the hypolimnion layer from going anaerobic and releasing TP may negate the need to spend countless millions of dollars on structural and non structural BMPs that may, or again may not, improve the water quality to a point where the 12 ug/l TP limit is met.

It is imperative we move away from the 'one size fits all' approach of 12 ug/l TP (that is only guidance and not a WQ concentration limit) reduction strategy concentration limit in all subsequent issued MS4 permits. Data verification, high level QA/QC and sampling protocols and annual pond physical condition should be the primary focus for the first five year permit cycle to accurately define the water quality improvements needed.

When Manchester looks at the other three TMDLs, and has had no visual verification of any algal blooms on either of these three ponds, it further supports that the 12 ug/l TP limit with 15 ug/l for chlorophyll-a as over restrictive and potentially very costly to the MS4 communities to comply with.

The below median data for TP for Dorrs Pond is 23 ug/l in the upper and 29 in the lower. There has been no recorded incidence of algal bloom in Dorrs Pond

Dorrs Pond WQ Summer Data Set from 2001 – 2007

	Upper TP ug/l	Lower TP ug/l	E-Inlet TP ug/l	Lessard Inlet TP- ug/l	Juniper Outlet TP- ug/l	Outlet TP ug/l	Secchi meters	Chlr-a ug/l	D.O. mg/l
# Samples	29	10	23	27	13	14	28	27	75
Minimum	13	16	9	11	5	19	1.1	1.5	0.1
Mean	25	29	26	33	74	27	1.8	11	5.5
Maximum	38	42	100	191	735	32	2.5	34.3	9.4
Median	23	29	21	27	16	28	1.7	8.9	5.6

The below median data for TP for Stevens Pond is 18 ug/l in the upper, 25 ug/l in the middle and 36 ug/l in the lower. There has been no recorded incidence of algal bloom in Stevens Pond

Stevens Pond WQ Summer Data Set from 2001 – 2007

	EPI TP ug/l	Meta TP ug/l	Hypo TP ug/l	Outlet TP ug/l	Secchi D in meters	Chlor-a ug/l	D.O. mg/l
# Samples	29	19	28	19	31	26	149
Minimum	9	10	9	10	1.2	0.9	0
Mean	22	28	44	22	2.7	17	5.4
Maximum	40	69	120	46	4.2	122.6	12.1
Median	18	25	36	19	2.9	7.2	6

The below median data for TP for Pine Island Pond is 21 ug/l in the upper, 26 ug/l in the lower and 34 ug/l in the bottom. There has been no recorded incidence of algal bloom in Pine Island Pond

Pine Island Pond WQ Summer Data Set from 2001 – 2007

	Upper TP ug/l	Lower TP ug/l	Bottom TP ug/l	Inlet TP ug/l	Outlet TP ug/l	Secchi D in meters	Chlor-a ug/l	D.O. mg/l
# Samples	32	13	28	33	31	32	30	149
Minimum	10	10	12	10	11	1	1	0
Mean	30	25	49	25	23	2	9	5
Maximum	220	39	422	132	52	5	22	11
Median	21	26	34	22	20	1.8	8	6

In close review of the data, the indication is that no one concentration parameter is a good indicator of overall compliance with WQ. It is an intricate interplay of Phosphorus, Chlorophyll-a, dissolved oxygen, water temperature, rain events etc. As can be seen from the above tables, all ponds were in non-compliance with the proposed 12 ug/l limit for TP, yet there was only one October incidence of algal bloom in one pond over a 12 year period. Looking at summer months

as being from May through October at four ponds that would give a total of 288 months of time at the four ponds. With only one month of non-compliance (Nutt Pond in October of 2007) that displays a non-compliance rate of <1/2 of 1% which is well within the compliance ratio as laid out in the NHDES CALM. This visual evidence over the 12 year period demonstrates that there is indeed compliance with WQ targets (no visible algal mats) and that the concentration targets are very conservative and do not serve MS4 communities best interests.

Costs to Implement the MS4 Permit

Manchester has calculated the cost to implement the abatement outlined in the four pond TMDLs as included in the NPDES, MS4 Draft Permit. The costs at 12 ug/l may indeed exceed $700 million dollars. There are other additional checks that are outlined in this report and all of these checks support the calculated $700 million dollar capital investment.

For the reasons identified herein Manchester believes that the models grossly overstate the needed reduction in annual pollutant loads that can go to these ponds. However, using the watershed data and water budget data from the TMDL reports we have looked at technology to treat for the loads as stated in the TMDLs. We were surprised at the cost potential and decided to match this against WWTP treatment costs. Manchester is in the fortunate position that it has operated under the MS4 permit since 2003 and runs the largest WWTP in the State, have reviewed the TMDLs thoroughly and have come up with the following conclusions regarding costs.

Manchester's WWTP treats wastewater from Manchester, Bedford, Goffstown and Londonderry and also takes Septage from a number of communities. The plant also takes in about 30+ mgd of Stormwater during wet-weather events. In 2010 Manchester's WWTP average daily discharge to the Merrimack River was 20.14 mgd (7.35 billion/gal/yr). In 2011 the WWTP average daily discharge was 24.22 mgd (8.84 billion/gal/yr). In 2012 the WWTP average daily discharge was 18.13 mgd (6.62 billion/gal/yr).

Table 3-1 of the TMDLs outlines a water budget. These water budgets are highlighted in the yellow cells of **Attachment 5** for each pond TMDL. The total watershed flow comprises atmospheric, runoff and base flow. As can be seen in the subsequent column of attachment 5, the Pine Island Pond watershed receives 18 billion gallons of inflow annually, Dorr's Pond 1.3 billion gallons of inflow, Stevens Pond 592 million gallons of inflow and Nutt Pond 638 million gallons of inflow annually. In total this is 20.57 billion gallons of flow from the watersheds of these four ponds. This is 2.33 to 3.11 times more flow than is treated at the WWTP (which also includes the wet weather events that are processed through the treatment plant) for an entire year. This provides a snapshot of the magnitude of the treatment requirements for the City's four pond TMDLs.

The NHDES is targeting a 100 ug/l TP in river limit for the WWTPs, yet is targeting a 12 ug/l limit in the ponds.

The City has a 23 year history of stormwater treatment and successfully used a StormTreat™ unit at Crystal Lake that was installed in 1989. In review of technical literature from the UNH Stormwater site and the performance expectations of each unit they've tested indicates that this is an appropriate system for meeting most of the pollutants outlined in the MS4 TMDLs would be the StormTreat units. Included as **Attachment 6** are the removal efficiencies for StormTreat. It is 90% effective or better for fecal coliform, TSS, most metals and phosphorus. These are the key pollutants in our MS4 area as indicated on Manchester's Surface Water Quality Status map (September 2008, **Attachment 7**).

A concern regarding key pollutants is that the NHDES has only focused on nutrient WQ impacts while keeping silent on metals. In review of CEI's Table 2-8 of their restoration plan, it determined during a wet weather sampling event in 2002 that lead had been measured between 9 ug/l and 147 ug/l, zinc was measured between 189 and 750 ug/l zinc and copper was measured between 220 and 680 ug/l. Chronic water quality parameters for lead are 2.5 ug/l, for zinc 120 ug/l and for copper 9 ug/l. The new TMDLs give a false hope that if a City/Town takes care of the nutrient problem, then everything else will be in compliance. The unknown is cadmium at a WQ level of 0.25 ug/l. Guard rails, galvanized piping, catalytic converters and metal brakes all have an abundance of cadmium in their construction. It is more than likely that all WQ within the State is impaired for cadmium.

The Nutt Pond testing demonstrates that this may indeed be the case and that a second round of structural BMP installations will need to be completed to achieve metals WQ compliance once the nutrient issues is resolved. That is why it is imperative that the next 5-year MS4 permit cycle be focused entirely on characterizing the water bodies within each affected community for WQ compliance before any structural implementation begins.

Manchester used the watershed acres for each of the four TMDL ponds as outlined in the MS4 draft permit (Nutt, Dorrs, Stevens and Pine Island) and determined a conservative percent pervious area for each watershed. All the data supplied in the TMDL was placed into a spreadsheet for quick reference (previous Attachment 5).

Manchester contacted the manufacturer of StormTreat to get an update of the costs to install these units. As StormTreat is one of the few structural BMPs that reduce nutrients and metals, we looked at similar installations to our Crystal Lake unit as it has proven to work and we know the maintenance history. The costing email from the StormTreat manufacturer and our design layout included as **Attachment 8.**

Each series of StormTreat units requires a baffle tank to assure consistent removals of total and suspended solids and a good working system. This additional maintenance cost was factored into the total cost as outlined in **Attachment 9**. Costs for the maintenance and upkeep of the baffle tanks to include inspections, cleaning, and annual planting are based on a decade of maintenance history.

A costing spreadsheet implementing StormTreat was developed (**Attachment 10**) for a 12 ug/l TP limit. The total conservative impervious area was estimated at 2,802 acres with an engineered need of 4,114 units to meet the treatment average of 60.5% of the TP load for all four TMDL watersheds. The estimated cost was is $766,649,420. The average annual maintenance cost would be a little over $3 million dollars a year (30% of Manchester's total $10 million WWTP operating budget for a year). This cost mirrors the initial capital investment cost to build a WWTP capable of treating this amount of wastewater. EPA issued a Fact Sheet, also included in **Attachment 10** that outlines a sample cost for stormwater management. That cost is outlined in the following table.

EPA Estimated Cost per 1,000 ft^2 for Stormwater Management

Impervious % Range	Rate/Month per 1,000 Sq feet
Vacant 0%	$ 0.08
Light development 1%-20%	$ 0.12
Moderate development 21%-40%	$ 0.16
Heavy development 41%-70%	$ 0.24
Very heavy development 71%-100%	$ 0.32

Manchester's Calculated Cost for meeting the 12 ug/l standard ($28.25)

	Total Acres Impervious 43,560 ft3 per acre – 2,802 impervious acres in Manchester
122,055,120	Total Sq. Footage within Manchester's 4 TMDL Ponds
12,205.51	10,000 sq ft lots within the TMDL drainage area
$ 1.60	EPA's Fact Sheet per lot/month cost to treat
$ 19,528.82	Monthly Cost via EPA's estimate
$ 234,345.83	Annual Cost EPA Estimate to treat
$ 62,811.74	Manchester Capital Cost per 10,000 sq.ft. lot
$ 3,140.59	Twenty Year Bonding the Annual Capital Cost
$ 249.74	Manchester Annual Maintenance Costs
$ 3,390.33	Manchester Annual 10,000 Sq Ft Cost
$ 28.25	**City Rate/month of 1,000 sq.ft pervious area**
$ 0.16	**EPA Rate/month of 1,000 sq ft pervious area**

Attachment 11 Evaluates the cost to meet a 13 ug/l limit by reducing the MOS slightly. The capital cost is reduced to $698,480,351 (4,048 units needed) that means a savings of over $68 million in capital costs and $250k in annual maintenance costs. The City's monthly rate for 1,000 sq.ft. of impervious cost would be $28.09 at 13 ug/l TP in-pond limit.

Attachment 12 Evaluates a 14 ug/l TP limit which reduces the MOS even further. The capital costs (3,679 units needed) saved at this 2 ug/l increase is almost $132 million with over $500k in annual maintenance costs. The City's monthly rate for 1,000 sq.ft. of impervious cost would be $28.07 at 14 ug/l TP in-pond limit.

Attachment 13 Evaluates a 15 ug/l TP limit (the approved limit in CEI's Watershed Restoration Plan) the target in pond TP limit during the time since this issuance of Manchester's 2003 MS4 permit. The Capital costs have now dropped to $571 million dollars (annual savings of almost $196 million) and an annual savings in maintenance of $762k. The City's monthly rate for 1,000 sq.ft. of impervious cost would be $28.07 at 14 ug/l TP in-pond limit. Even though the TP limit has gone up in each of the above examples the economy of scale reduces with reducing pervious area so the costs remain essentially the same but spread out over less users.

Another cost verification is reviewing what Manchester has already completed for BMP structural work at Nutt Pond. Manchester has spent approximately $1.5 million on restoration of wetland, two forebays, an inlet structure at the north inlet., pervious pavers, and plantings placed along the west side of the pond.

Nutt Pond's water budget is 637.65 million gallons per year. This is 3.1% of the total water budget (20.57 billion gallons) throughout the four TMDL listed ponds. Manchester anticipates that this additional constructed wetland may, or may not bring the pond in compliance with a 15 ug/l TP limit as outlined in the CEI document, and may not increase the D.O. non-compliance that is currently being experienced at the center of the pond in the epilimnion layer.

Nutt Pond will definitely not be in compliance with the 12 ug/l TP limit as proposed in the latest AECOM TMDL. To reduce this further to the 12 ug/l, Manchester would need to take the remaining footprint around the pond to further develop additional BMPs and also move out within the watershed to capture the flows that are not conveyed through the west and east inlets (See CEI Appendix C, Site Evaluations in Attachment 1). The current and planned BMPs treat approximately 20% +/- on the incoming flows to the pond (120 mil/gal/yr) an additional 80% BMP installation plan would need to be installed to treat to a level of 12 ug/l. As we are moving out in the watershed Manchester will need to purchase additional land, and install smaller structural BMPs, as the flow is not as concentrated as it is within the vicinity surrounding the pond. It can be expected that this additional cost would be upwards of $20 million dollars to achieve both a consistent 12 ug/l TP and raise the D.O. to above the 5 mg/l minimum concentration.

If $20 million dollars represents 3.1% of the water budget than the cost for watershed wide BMPs in the 4 TMDL pond areas is going to be $645 million dollars. In review of the three calculated examples, it will cost Manchester over ½ of a billion dollars to meet the TMDL at four ponds. We still have a significant portion of the watershed in which to meet WQ standards. A billion dollars of cost is a real potential.

Another cost verification was performed looking at the UNH, Greenland Meadows LID Case Study **(Attachment 14)**. The cost for Stormwater related site work was $6,940,300 to treat 25.6 acres of pervious area (Table 1). As outlined in the 12 ug/l construction scenario, Manchester would be treating 2,802 pervious acres of land. That gives a ratio of Manchester pervious vs. Greenland Meadows pervious of 109.5:1. This factor multiplied by the $6,940,300 cost for Greenland Meadows gives a total outlay of $759,962,850 for Manchester's cost to provide treatment for our four pond TMDLs. The calculated total cost in Attachment 10 is $766,649,420 confirming that Manchester's costing approach is sound and realistic to achieve WQ compliance in four urban ponds.

As can be seen at concentrations this small, with watershed budgets in the billions of gallons, cost can be astronomical when looked at closely. The NHDES 20% MOS is costing Manchester an additional $196 million in capital costs and over $760k in ongoing annual maintenance costs for the four pond TMDLs. As can be seen from the attached spreadsheets, the 20% MOS is a costly position that should not be mandated upon cities and towns where the TMDL ponds lie strictly within the municipal boundary.

Attachment 15 looks at an Assay Grade chemical manufacturer's certificate of impurities for these acids that are used to fix field samples. As can be seen from the information provided, three drops of nitric acid have a probability of adding up to 15 ug/l of phosphate to a sample.

Allotted Time for Implementation

Manchester does not use assay grade acids for fixing sample containers and we are wondering if this is a practice that the NHDES labs undertakes to prepare samples.

Manchester has embraced an accelerated catch basin (CB) cleaning schedule within the City and has a program where the CBs immediately within the ponds watershed area are cleaned more frequently. We have installed a forebay and reconstructed an obsolete wetland at the east inlet of Nutt's Pond, a forebay and new inlet structure at the north inlet, porous pavers and plantings on the west side of the pond, and have plans for a gravel wetland to be installed over this summer. This is 13 years in the making and Manchester believed that this progress schedule kept within the spirit of the TMDL Executive Summary of, *"It is expected that these reductions would be phased in over a period of several years."* It is clear within this new draft MS4 permit that it is now a five-year period to complete several orders of magnitude of BMP structural implementation than what was done over the past 13 years. Much different than our expectations at the time the TMDL was put out to Public Comment.

Manchester has been ahead of the curve as we were deemed an MS4 community with the first permit issued in 2003. We have been in full compliance with the permit and have struggled to put together the funding to complete those requirements outlined in the first MS4 permit. This proposed MS4 Permit sets up conditions and expectations that are unrealistic for even the wealthiest communities across the country.

As the time schedule was accelerated at several orders of magnitude than Manchester ever thought would be proposed the City did a through investigation of the Surface Water Quality Status map for Manchester (previous attachment 7). Within this map, numerous water bodies are impaired for bacteria, metals, pH, D.O., D.O. saturation, chlorides, chlorophyll-a, Benthic-Macro invertebrate Bioassessments, foam / flocs / scum & oils, and non-native aquatic plants. BMPs will not significantly reduce all of these parameters by themselves and structural installations will eventually be the order of the day. Manchester has undertaken the BMP route for 13 years and obviously from the TMDLs issued has had little success with reaching the new goal of 12 ug/l for TP.

END OF COMMENTS